An Aggregative Theory for a Closed Economy

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Chapter 2

AN AGGREGATIVE THEORY FOR A CLOSED ECONOMY*

Karl BRUNNER and Allan H. MELTZER

1. Introduction

For more than a generation, aggregative analysis of a closed economy has remained within the confines of the Keynesian framework as interpreted by Hicks (1937). Metzler (1951), Patinkin (1965) and others provided an alternative interpretation of Keynes (1936). Later extensions introduced anticipations and growth without altering the main qualitative conclusions. In both interpretations, the short-run response to monetary and fiscal policy is transmitted mainly by interest rates and depends on properties of the demand function for money and the expenditure function. A large interest elasticity of the demand for money increases the short-run response of output to fiscal policy. A large interest elasticity of consumption or investment expenditure increases the short-run response of output to monetary policy.

The meaning of "interest rates" differs in the two interpretations, and the adjustment processes differ as a consequence. In the common textbook version, interest rates are borrowing costs and portfolio adjustment consists of substitution between money and a narrow range of financial assets called bonds. Metzler's financial asset is a composite representing claims to real capital. Bonds are perfect substitutes for such claims, and interest rates are the yield per period of a unit of real capital.

In Metzler's analysis real resources are fixed, so long-run output is fixed. The long-run effects of monetary and fiscal policies are on prices and interest rates. Changes in money change the price level but leave interest rates and real balances unchanged. Open market operations and changes in tax rates transfer ownership

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of claims to streams of real income between the government and the private sector. Interest rates rise in response to open market sales and reductions in tax rates and fall in response to open market purchases and tax increases. Open market operations induce larger changes in the price level than tax changes that transfer securities of equal value, but the effects on real balances are identical. Open market purchases raise the equilibrium price level; open market sales lower the equilibrium price level.

All of the above conclusions are derived from a static model of exchange in which government is, at most, an agency for redistributing income by changing the ownership of wealth. Similar conclusions have been obtained for a growing economy under similar assumptions. In the Hicksian version, the government purchases goods and services. The long-run implications for prices and interest rates of issuing and withdrawing bonds are rarely discussed.

The basic difference between Hicks' and Metzler's analysis of portfolio adjustment reflects a difference in the assumptions about transaction costs. The Hicksian approach makes the cost of adjusting real assets in portfolios infinite. The Metzler approach sets these costs approximately equal to the transaction costs for securities, at or near zero. An intermediate position permitting adjustment of real capital, or claims to real capital, bonds and money seems to us more appropriate for aggregate analysis.

Our version of the monetarist hypothesis analyzes an economy in which costs of adjusting real capital in portfolios are neither zero nor infinite. Finite transaction costs place a wedge between the price of current output and the price of existing real capital. Substitution is not limited to two assets but includes the entire spectrum of assets. Adjustment is not limited to "the interest rate" but includes the relative prices of real capital and financial assets.

In two previous papers (1972, 1974a), we developed a general framework involving interaction between three assets. Wealth owners may accumulate or decumulate each of the assets—money, financial assets, and real capital—and may purchase current output. The economy is closed and, as in most of our discussion here, there is no growth in the stock of real capital, population or effective labor force. Interest rates, the prices of output and real capital are variable, however, and there is a government that purchases goods and services, taxes, finances deficits and surpluses and engages in open market operations.

Several of the conclusions obtained from a model with only two assets do not hold in a three-asset model. We have shown [Brunner and Meltzer (1974a)] that the slopes of the expenditure functions and the demand function for money do not determine the relative size of the responses to fiscal and monetary policies. Contrary to frequent assertions, the major issues in aggregative analysis cannot be reduced to propositions about the relative slopes of the IS and LM curves.
In this paper, we consider standard propositions about the effects of policy changes in a closed economy. The following two sections present the model, develop conditions for equilibrium on the markets for assets and output, and show that the interaction of policy variables and market variables determine interest rates, prices, output and the government's budget position. Next, we consider the effects of monetary and fiscal policies and the financing of deficits and surpluses. The conclusion examines the main empirical conjectures that separate monetarist and Keynesian views.

2. The Framework

In the economy that we analyze, private decisions to hold, acquire or dispose of assets and to consume are made in response to prices and anticipated prices including the prices of current output, existing real capital and the market rate of interest. Government decisions on tax rates, expenditure and the financing of the budget surplus or deficit are summarized in a budget equation. For given tastes, opportunities and anticipations, and given wage rates, the decisions of the government and private sectors determine the level of output, the market rate of interest, the size of the budget deficit or surplus and the prices of real capital and current production. The economy is closed, and the capital stock and money wages are given. At a few points we relax the last constraints and permit the capital stock or money wage to change.1

2.1. The Output Market

Three principal equations describe the output market. Equation (1), is an equilibrium condition. Real output produced by the private sector, $y$, is absorbed by the private and government sectors. Real government expenditure, $g$, is set by government. Private expenditure, $d$, depends on prices and wealth, as shown in equation (1'). Equation (1") describes the pricing behavior of producers. Output prices, $p$, are revised in response to current market conditions expressed by $y$, real capital stock, $K$, efficiency wage rate, $w$, and suppliers' anticipations of prices, $\phi$.2

1 More attention is given to longer-run consideration in Brunner (1974b). The international aspects were integrated in some detail in Brunner and Meltzer (1974b).
2 There is no labor market in our model. The influence of the labor market on output, prices and other variables come through $w$ and $W_h$, the efficiency wage and the value of current and future income from labor services. In a more complete analysis, $w$ would be replaced by a solution of the labor market equations. Wage rates and interest rates are net of income and other taxes.
$y = d + g$, 

$$d = d(i - \pi, p, p^*, P, e, W_n, W_h), \quad d_1, d_2 < 0; \quad d_3, \ldots, d_7 > 0, \quad (1')$$

$$p = p(y, K, w, \phi), \quad p_1, p_2, p_3 < 0; \quad p_4 < 0. \quad (1'')$$

The variables affecting private expenditure are: $i$, the market rate of interest; $\pi$, the rate of inflation anticipated on the credit market; $p^*$, the price level anticipated by purchasers; $P$, the current price of existing real capital; $e$, the anticipated return to real capital per unit of capital; $W_n$ and $W_h$ are, respectively, human and non-human wealth at market value.

Differences between anticipated and actual outcomes affect the output market in a number of ways. The anticipated return to real capital may differ from the real rate of interest received and paid by lenders and borrowers on the credit market. Prices anticipated by purchasers may differ from the prices anticipated by suppliers, and both may differ from prevailing prices. The market rate of interest is related to prices and to anticipated returns, and in long run, steady state equilibrium, satisfies the equation

$$i = \frac{p}{P}e + \pi.$$

Elsewhere, the equality need not hold.

Both $W_h$ and $e$ depend on the level of real income and on the tax rates applicable to income from labor and capital. We assume that, for given tax rates, there is sufficient regularity in the distribution of income to permit us to neglect explicit references to the effect of changes in the distribution on expenditure, borrowing, lending or money holding. Human wealth, $W_h$, depends on wages, prices, and the tax rates applicable to income of this kind. Tax rates on non-human wealth affect the expected return to capital, $e$, and the returns received by owners of real assets, $pe/P$.

Non-human wealth at market value is the sum of base money, $B$, government securities held by banks and the non-bank public, $S$, and the stock of capital, $W_h$,

$$W_h = PK + v(i, \tau)S + (1 + \omega)B.$$

$S$ is the face value of the stock of government debt, and $v$ is the market value per unit of debt. The market value of the debt depends on the difference between market and coupon rates, on maturity, and on the tax rates applicable to income from this source. The market value, $v$, depends negatively on $i$ with an elasticity, $\epsilon(v, i)$ dependent on maturity structure; $\epsilon(v, i)$ rises algebraically as the maturity declines. The parameters $\tau$ and $\omega$ represent a vector of tax rates and the net worth.

$^1$This expression is equivalent to the public's net worth.
multiplier of the banking system, respectively. The latter reflects a Pesek–Saving (1967) effect resulting from a regulated, non-competitive banking system and the real resources invested in the banking system but not included in K. The monetary base, B, is the total monetary liability of the monetary authorities and is equal to total bank reserves and currency outstanding.

The output market proximately determines real output and the price level for given values of the other variables. Interest rates and asset prices affect the output market but are proximately determined in the asset markets. Money wages, anticipated prices, tax rates and real government expenditure are treated as given. In a closed economy, base money and outstanding securities are cumulated sums remaining from the financing of fiscal and monetary policies. Current changes in the base and the outstanding stock of securities depend on policy decisions and the position of the economy. The remaining component of wealth, real capital, is taken as given until the restriction is relaxed below.

2.2. The Asset Markets

Two asset markets, a credit market and money market, proximately determine the interest rate, i, and the asset price level, P. Interaction of the credit and money markets redistributes the components of existing wealth—money, government securities (or non-money financial assets) and real capital—among wealth holders until all assets are willingly held. Money is a substitute for securities and real capital, not for securities alone.

The credit market distributes the stock of outstanding securities between banks and the non-bank public and proximately determines the market rate of interest, i. Credit is defined as the asset portfolio on the consolidated balance sheet of the banking system and consists of bank loans and the banks' holdings of government securities. The stock of credit is the product of the monetary base, B, and the bank credit multiplier, a. The latter depends on all of the arguments of the expenditure function,4 with derivatives shown in equation (2), and on policy variables such as the discount rate and the reserve requirement ratios represented by the dots in the a-function. The public's supply of earning assets to banks, σ, depends on all the variables introduced in our discussion of the output market, and on the outstanding stock of securities, S. Equation (2) is an equilibrium condition for the stock of

4 More complete discussion of the bank credit and money multipliers—and the credit and money markets—can be found in several of our earlier papers. See Brunner and Meltzer (1968, 1974a), Brunner (1974a), or Burger (1972). Equations (2) and (3) can be interpreted as partially reduced forms.
bank credit,

\[ a(i, p, P, W_n, W_h, e, \ldots)B = \sigma(i - \pi, P, p, p^*, \phi, e, S, W_n, W_h), \]  
\[ a_1, a_3, a_4 > 0 > a_2; \sigma_1, \sigma_2 < 0; \sigma_3, \ldots, \sigma_7 > 0. \]  

For the public, buying securities is an alternative to repaying loans, and selling securities is an alternative to borrowing from banks. The derivatives of the first six terms of the \( \sigma \) function show that prices, anticipated prices and returns affect the two components of \( \sigma \) – the public’s desired borrowing and the excess supply of securities offered to banks – in the same way. Changes in wealth affect the two components in opposite ways. Hence, the derivatives with respect to wealth are small and of uncertain sign.

The demand for money is not equivalent to the public’s supply of earning assets to banks, and the stock of money is not identical to the stock of bank credit. The money market of our analysis proximately determines the asset price level, \( P \), and for given values of \( p \) and \( e \), determines the real rate of return on real capital.

The asset price level is distinct from the price level of new production. Costs of adjustment associated with the acquisition of real capital, and costs of acquiring information about market opportunities, assure that \( p \) and \( P \) are, generally, not equal. In full long-run adjustment to a steady state, with all costs variable, all opportunities realized, and all anticipations equal to actual values, existing capital sells at reproduction cost, and the real return to real capital equals the expected return, \( e \).

Equation (3) is the equilibrium condition for the money market. The stock of money is the product of a money multiplier, \( m \), and the monetary base. Interest rates, asset prices and wealth affect the money multiplier and the stock of money by changing the distribution of money between currency and demand deposits and the distribution of deposits between time and demand accounts. Reserve requirement ratios and the discount rate affect the money multiplier by changing the distribution of reserves between required and surplus reserves or by increasing or decreasing borrowing from the central bank.

\[ m(i, p, P, W_n, W_h, \ldots)B = L(i, p^*, \phi, e, p, P, W_n, W_h), \]  
\[ m_1, m_2 > 0; m_3, m_4 < 0; \]  
\[ L_1, \ldots, L_4 < 0; L_5, \ldots, L_8 > 0. \]  

The demand for money depends on all of the arguments of the \( \sigma \) function except \( S \). However, the properties of the two functions differ. Changes in anticipated prices, the anticipated rate of price change, the anticipated yield on real capital, and the asset price level shift \( L \) and \( \sigma \) in opposite directions. Moreover, the wealth elasticities of \( L \) are considerably larger than the wealth elasticities of \( \sigma \)
Our analysis explicitly rejects the traditional Keynesian view that identifies the demand for money with the supply of earning assets of banks [Granley and Chase (1965)]. Failure to separate the markets for money and credit restricts such analysis – for example, IS–LM analysis – to a world in which there are at most two assets. We do not believe it is possible to correctly analyze the adjustment of prices and output to government fiscal and monetary policies without separating the credit and money markets, or alternatively, distinguishing money, bonds and real capital.

2.3. The Government Sector

An understanding of the effects of monetary and fiscal policy requires analysis linking the government budget deficit or surplus and the financing of the budget with the markets for assets and output [Christ (1972) and Silber (1970)]. Changes in tax rates or government expenditure affect the output market directly. Changes in the volume of base money and securities issued to finance the budget deficit also change expenditure, and more importantly, change the position of the asset market. Even a constant, maintained deficit or surplus affects the markets for assets and output. The reason is that the financing of any deficit or surplus alters the nominal stocks of base money and securities and changes the prices of assets and output.

Equation (4) is the government's budget equation. The government's purchase of goods, $pg$, labor services, $wlg$, and interest payments (net of taxes), $I(i)S$, are financed by tax revenues, $t(p, y, wlg; \tau)$, and by issuing base money and securities. All bonds are issued at par,

$$pg + wlg + I(i)S - t(p, y, wlg; \tau) = \hat{B} + \hat{S}. \tag{4}$$

In a closed economy, most changes in the base and the stock of securities result from the financing of the current deficit or from open market operations.

The government hires labor at the market money wage $w$, and pays interest on its outstanding debt. Interest payments depend on the maturity and volume of debt. Expenditure $g$ (or $pg$) the number of workers hired, $lg$, or expenditure for labor services, $wlg$, and the tax rate schedule, $\tau$, are set by policy decisions. We are free to choose either $\hat{B}$ or $\hat{S}$ or some combination as an additional policy variable. The proper choice depends on the institutional arrangements prevailing in a given economy. Most central banks and governments do not choose explicitly but, instead, attempt to damp fluctuations in interest rates. Let $\mu$ be the portion of the current deficit or surplus financed by issuing or withdrawing base money, and let $\nu$ be the amount of base money issued or withdrawn by open market operations.
conducted independently of deficit finance. \( \hat{B} = \nu \) whenever the budget is balanced. If the budget is unbalanced, \( \nu = 0 \) whenever \( 0 < \mu < 1 \). More generally,

\[
\hat{B} = \mu(pg + \nu lg + IS - t) + \nu,
\]

and

\[
\hat{S} = (1 - \mu)(pg + \nu lg + IS - t) - \nu.
\]

We treat \( \mu \) as a policy parameter describing the financing of the government budget.

3. Interaction of the Budget and the Markets for Assets and Output

Every displacement of the equilibrium position of the credit, money or output market affects the other markets and the budget equation. Every change in the budget position affects the markets for assets and output. Every change in stocks, flows or the budget changes relative prices, tax collections and the amounts of base money and securities issued or withdrawn. In this section, we analyze the interaction of the system and show the conditions for stock–flow equilibrium. Diagrams illustrate the main points.

The position of flow equilibrium must satisfy the equilibrium condition, equation (1), relating actual and desired output or expenditure. Desired expenditure depends on \( P \) and \( i \). Changes in the stocks – \( B, S, \) or \( K \) – affect \( P \) and \( i \) and shift the position of flow equilibrium, so the flow equilibrium depends upon the position of the asset market.

To take account of the effect of the asset markets on the flow equilibrium, we first solve the asset market equations for \( P \) and \( i \). The solutions for \( P \) and \( i \) depend on \( p \) and \( y \) because the multipliers \( m \) and \( a \) and the \( L \) and \( a \) functions depend on prices and output. The dependence on \( y \) reflects the presence of \( W \) and \( e \) in the asset equations. Let \( \epsilon(i, y|AM) \), \( \epsilon(P, y|AM) \) and similar expressions with output price \( (p) \) in lieu of \( y \), denote the elasticities of \( i \) and \( P \) with respect to prices and output derived from the equilibrium conditions for the asset markets given the position of the output market. Next we substitute the solutions for \( i \) and \( P \) obtained from the asset market equations into the \( d \) function and obtain an implicit function, shown by the \( d + g \) line, involving \( p \) and \( y \). Then we differentiate the equilibrium condition for the output market with respect to \( y \) and solve for \( \epsilon(p, y|d + g) \), the slope of the \( d + g \) curve in figure 1. The slope is the elasticity of \( P \) with respect to \( y \) obtained from the expenditure and asset market equations. The bars on

\footnote{The appendix describes the asset market responses discussed in the text.}
Aggregative theory for a closed economy

$\epsilon(d, i)$ and $\epsilon(d, P)$ indicate that these elasticities include the effect on expenditure of the change in wealth induced by changes in interest rates and asset prices.

$$
\epsilon(p, y|d + g) = \frac{1 - (1 - y) [\epsilon(d, i) \epsilon(i, y|AM) + \epsilon(d, P) \epsilon(P, y|AM) + \epsilon(d, W_h) \epsilon(W_h, y)]}{(1 - y) [\epsilon(d, p) + \epsilon(d, i) \epsilon(i, p|AM) + \epsilon(d, W_h) \epsilon(W_h, p)]^{-1}}.
$$

The numerator and denominator depend on the proportion of total output absorbed by government, $\gamma = g/(d + g)$, and on the relative responses of expenditure to asset prices, interest rates and output prices. The elasticity is likely to be negative. The magnitude increases (numerically) as $\gamma$ increases. The rate of use of resources, $y/K$, also affects the size of the elasticity. At low rates of utilization the numerator is smaller than at high rates. The reason is that $\epsilon(i, y|AM)$ and $\epsilon(P, y|AM)$ change with the utilization of capacity and the distribution of income. To simplify the notation, we rewrite the slope of $d + g$ as

$$
\epsilon(p, y|d + g) = \frac{1 - (1 - y) \epsilon(d, y)}{(1 - y) \epsilon(d, p)} - 1.
$$

The barred values of the elasticities are defined by the corresponding expressions in the brackets above. The position of the $d + g$ curve depends on anticipations and stocks. The curve is the locus of all $p, y$ combinations satisfying the output and asset market equations simultaneously.

The supply curve ($s$) of output is obtained from the price setting function, equation (1*). The price elasticity of the supply of output increases as capacity utilization increases. The position of the supply curve depends on $K, w$ and $\delta$. The slope of the supply curve is denoted $\epsilon(p, y|s)$.

Figure 1a shows a flow equilibrium at the intersection of $d + g$ and $s$. The equilibrium position depends on the stocks of financial assets and real capital, the efficiency wage and anticipations. The size of the financial stocks depends, in turn, on the history of the government’s budget and the financing parameter, $\mu$.

In a closed economy with no growth, there cannot be full stock-flow equilibrium.

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4 The homogeneity properties of the $d$ function assure that $\epsilon(d, p)$ is large relative to the elasticities with respect to $P, W_h, W_n$ and $p^*$. The denominator is unambiguously negative. A very large positive value of $\epsilon(d, P)\epsilon(P, y|AM)$, substantially greater than unity, is required to turn the numerator negative and determine an ascending “demand” curve. This is unlikely. The $d + g$ curve is an equilibrium position for expenditure, not an expenditure relation as we incorrectly described it in an earlier paper (1974a). J. Marquez-Ruarte pointed out the error. The $d + g$ line is the locus of all combinations $(p, y)$ simultaneously satisfying asset markets and output markets.

5 The distribution of income changes with fluctuations in income. At low rates of utilization, changes in $y$ have larger effects on $e$ than on $W_h$, while at high rates of utilization, the opposite is true. The elasticities $\epsilon(e, y)$ and $\epsilon(W_h, y)$ are components of $\epsilon(i, y|AM)$ and $\epsilon(P, y|AM)$. On the supply side, $\epsilon(p, y|s)$ rises monotonically with the degree of utilization.
with an unbalanced budget. The relation between the government’s budget and the position of the economy is expressed by the balanced budget equation and shown by the bbe curve in figure 1. The bbe curve is the locus of all \( p, y \) combinations that satisfy the asset market equations and the balanced budget equation. To obtain the curve, we substitute the solution for \( i \) from the asset market equation into the balanced budget,

\[
i = i(y, p, B, S),
\]

\[
pg + \hat{w}lg + I(i)S = t(p, y, \hat{w}lg; \tau).
\]

The position of the curve depends on fiscal and monetary policies. Increases in \( g \), \( lg \), or \( S \) move the line to the right; increases in \( \tau \) move the line to the left. The slope of the line, holding \( w \) constant, is

\[
e(p, y|\text{bbe}; g) = \frac{\epsilon(t, y) - \epsilon(\alpha, \beta) \epsilon(\alpha, y|AM) IS/t}{pg/t - \epsilon(t, p) + \epsilon(\alpha, \beta) \epsilon(\alpha, p|AM) IS/t} < 0.
\]
The elasticity $\epsilon(I, i)$ rises from zero to unity as the average maturity of the debt declines. With a positive wage bill and a positive volume of outstanding government debt, the ratio $pg/t < 1$. The bbe line is negatively sloped for all tax revenue functions at least proportional in the price level, i.e., for $e(t, p) \geq 1$. If, as we have assumed, government sets the level of real expenditure, $g$, the bbe line is relatively steep. If the government directs its fiscal policy at nominal expenditure, $pg$, the elasticity becomes

$$
\epsilon(p, y|\text{bbe}; pg) = \frac{-\epsilon(t, y) + \epsilon(I, i) \epsilon(i, y) AM}{\epsilon(t, p) - \epsilon(I, i) \epsilon(i, p) AM} IS/t,
$$

and the value of the elasticity is approximately $-1$.

All points on the bbe line are, by definition, positions of budget balance. Any price output combination to the right of the line generates a budget surplus, and any point to the left of the line generates a budget deficit. Every budget deficit or surplus requires the banks and the public to increase or decrease holdings of base money and debt, so any departure from the bbe line affects the position of the $d + g$ line. Changes in financial stocks change $P$ and $i$ and modify the $d + g$ line. It follows that all points of stock-flow equilibrium must lie at the common intersection of the bbe line, the $d + g$ line and the $s$ line. An equilibrium of this kind is shown at $p_0, y_0$ in figure 1a.

3.1. Short-Run Equilibrium

Suppose the output market comes into short-run flow equilibrium with output less than $y_0$, for example at $p_1, y_1$ in figure 1b. With current fiscal policies shown by the position of the bbe line, the government budget has a deficit. The size of the deficit increases with the horizontal distance, $y_1 - y_2$, between the position of flow equilibrium at the intersection of $d + g$ and $s$ and the position of budget balance on the bbe line at the prevailing price level, $p_1$. A budget surplus forces a reduction in the stocks of base money and securities, and a budget deficit requires an increase in the stocks of these financial assets. The relative size of the changes in each stock depends on the financing parameter, $\mu$, and the speed of adjustment to a balanced budget equilibrium depends on $\mu$ also. As the value of $\mu$ increases, the change in the base and the speed of adjustment to a new equilibrium increase.

\footnote{A positive slope of the bbe line does not alter the main conclusions of the analysis unless the slope of the bbe line exceeds the slope of the s curve. For the problem to arise, the share of taxes allocated to interest payments must be so large that increases in output increase interest rates and raise the budget deficit and reductions in expenditure induce ever-increasing budget surpluses.}
However, for given \( w, K \) and unchanged position of \( s \), the total size of the adjustment from \( p_x y_x \) to a position of stock–flow equilibrium declines as \( \mu \) increases.

### 3.2. Intermediate-Run Equilibrium

We refer to the resulting stock–flow equilibrium, at an intersection of the \( d + g \), \( s \), and \( bbe \) curves, as an intermediate-run equilibrium to emphasize that money wages are constant and \( s \) remains fixed. The adjustment to intermediate-run equilibrium involves changes in the \( d + g \) line and the \( bbe \) line. These changes are the responses to the changes in \( B \) and \( S \) issued to finance the deficit – or retired if a surplus replaces the deficit – in figure 1b.

Financing the deficit increases \( B \) and \( S \) in the proportion defined by \( \mu \). Increases in \( B \) and \( S \) shift the \( d + g \) line to the right. The size of each shift is obtained by differentiating the output market equation with respect to \( B \) or \( S \) after replacing \( i \) and \( P \) with their respective solutions from the asset market equations, holding the value of \( y \) constant. The two vertical shift elasticities are

\[
\varepsilon(p, B | d + g) = \left[ -\varepsilon(d, i) \varepsilon(i, B | AM) + \varepsilon(d, P) \varepsilon(P, B | AM) + \varepsilon(d, W_n) \frac{(1 + w)B}{W_n} \right] \left[ \varepsilon(d, P) \right]^{-1} > 0,
\]

\[
\varepsilon(p, S | d + g) = \varepsilon(p, B | d + g) \left[ \varepsilon(d, i) \varepsilon(i, S | AM) + \varepsilon(d, P) \varepsilon(P, S | AM) + \varepsilon(d, W_n) \frac{vS}{W_n} \right] \left[ \varepsilon(d, P) \right]^{-1} > 0.
\]

Both elasticities are positive, so the direction in which the \( d + g \) lines shifts is independent of the method of financing the deficit or surplus. The \( d + g \) line always shifts in the direction of the \( bbe \) line, toward a position of budget balance.

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A low interest elasticity of expenditure \( \varepsilon(d, i) \) is clearly not sufficient to eliminate the effect of monetary policy. The sign of the denominator of \( \varepsilon(p, B | d + g) \) is discussed in the appendix. The sign of the numerator depends on \( \varepsilon(i, B | AM) < 0 \) and \( \varepsilon(P, B | AM) > 0 \). The former is unambiguous; the latter occurs if the interest elasticity of the excess supply of credit exceeds the interest elasticity of the excess supply of money. The signs of the elasticities of \( i \) and \( P \) with respect to \( B \) and \( S \) are shown in the appendix. The positive sign of \( \varepsilon(p, S | d + g) \) requires that in the numerator

\[
|\varepsilon(d, i) \varepsilon(i, S | AM)| < |\varepsilon(d, P) \varepsilon(P, S | AM) + \varepsilon(d, W_n) \frac{vS}{W_n}|.
\]

The restriction assures that issues of debt to finance expansive fiscal policies increase expenditure and prices. A very large \( \varepsilon(d, i) \) reverses the response of output and prices to debt financed fiscal policy. The stability of the system requires that the inequality above holds.
The size of the shift depends on the relative amounts of base money and debt issued (or withdrawn in the case of a surplus). The larger the value of $\mu$, the larger is the instantaneous shift in the $d + g$ curve. This is shown by the elasticity formulas. The response of the $d + g$ line to a unit change in debt, $\epsilon(p, S|d + g)$, is proportional to $\epsilon(p, B|d + g)$, the response to a unit change in the base. The denominator of the proportionality factor, or ratio, is positive, but the first two terms of the numerator are of opposite sign. The ratio is less than one, so the response of the $d + g$ line to a unit change in the base exceeds the response to a unit change in debt.

The vertical shift in $d + g$ and the slopes of the $d + g$ and $s$ curves determine the position of flow equilibrium to which the system moves in response to changes in $B$ and $S$. We use $\epsilon(p, B|0, AM)$, $\epsilon(y, B|0, AM)$ and similar expressions with $S$ replacing $B$ to denote the responses of prices and output to financial stocks. As before, the responses combine the adjustment of the asset markets and the output market to changes in the financial variables, holding the position of $s$ constant. The $0, AM$ elasticities define the movement of the flow equilibrium point determined by $d + g$ and $s$ in figure 1.

$$\epsilon(p, B|0, AM) = \frac{-\epsilon(p, B|d + g) \epsilon(p, y|s)}{\epsilon(p, y|d + g) - \epsilon(p, y|s)} > 0, \quad (5')$$

$$\epsilon(y, B|0, AM) = \frac{-\epsilon(p, B|d + g)}{\epsilon(p, y|d + g) - \epsilon(p, y|s)} > 0. \quad (5'')$$

The responses of $p$ and $y$ to $S$ (or $g$) are similar to equations (5') and (5''); $S$ (or $g$) replaces $B$ in the first term of the numerator.

The response of the flow equilibrium position to a given deficit is a weighted combination of the separate responses of $B$ and $S$ with weights fixed by financial policies. Let $D$ be the cumulated deficit. In a closed economy, the current stocks of $B$ and $S$ record past financial policy,

$$B = B_0 + \bar{\mu}D, \quad (6')$$

$$S = S_0 + (1 - \bar{\mu})D, \quad (6'')$$

where $\bar{\mu}$ is the mean value of the financing parameter, and $B_0$ and $S_0$ describe stocks of base money and government securities acquired independently of the budget process. $B_0$ and $S_0$ are the values of any prehistoric stocks of base money or securities modified by the cumulated effect of pure open market operations, $v$.

The weighted shift of the $d + g$ curve induced by a deficit (or surplus) per unit, is

$$\epsilon(p, D|d + g) = \epsilon(p, B|d + g) \bar{\mu} \frac{D}{B} + \epsilon(p, S|d + g) (1 - \bar{\mu}) \frac{D}{S} > 0.$$
All terms are positive, so the direction of response is independent of current and past financial policies. The magnitude of the response depends on both current and past policies. A large value of \( \bar{\mu} \) raises \( \epsilon(p, D|d + g) \) and the adjustment speed of the flow equilibrium.

The movement to a new flow equilibrium position reduces the initial deficit (or surplus). However, the size of the deficit depends on the distance between the flow equilibrium position and the bbe line. The position of the bbe line is also changed by the financing of the deficit or surplus and the direction of change depends on the way in which the deficit is financed. The vertical shifts of the bbe line, per unit change, are expressed as elasticities. The elasticities are obtained by differentiating the government budget equation with respect to \( B \) and \( S \) taking into account the effect of price changes on interest rates, holding money wages constant. The numerators of the two elasticities are of opposite sign. The denominators are negative wherever tax revenues are not sufficiently regressive.

\[
\epsilon(p, B|bbe; g) = \frac{-\epsilon(i, I) \epsilon(i, B|AM) IS/t}{pg/t + \epsilon(i, p|AM) \epsilon(i, i) IS/t - \epsilon(i, p)} < 0,
\]

\[
\epsilon(p, S|bbe; g) = \frac{-\epsilon(i, I) \epsilon(i, S|AM) IS/t}{pg/t + \epsilon(i, p|AM) \epsilon(i, i) IS/t - \epsilon(i, p)} > 0.
\]

An increase in \( B \) lowers the bbe line, whereas an increase in \( S \) raises the line. The size of the change in the bbe line depends on the relative sizes of the numerators of the two shift elasticities. With \( \epsilon(I, S) \) equal to unity, \( \epsilon(p, S|bbe) \) probably exceeds |\( \epsilon(p, B|bbe) \)|. At high values of \( \mu \), deficits shift the bbe line to the left and surpluses shift the bbe line to the right. At low values of \( \mu \), deficits move the bbe line to the right and surpluses move the line to the left.

The speed of convergence to intermediate-run equilibrium and the equilibrium position depend on the value of \( \mu \). With \( \mu = 1 \), the \( d + g \) line shifts up when there is a deficit and down when there is a surplus. The bbe line shifts the opposite way, down when there is a deficit and up when there is a surplus. The process converges to equilibrium at an intersection of \( d + g \), \( s \) and bbe. In figure 1b, with \( \mu = 1 \) the bbe curve slides down the \( s \) curve until it meets the rising \( d + g \) curve. For values of \( \mu \) near unity, similar movements take place, but as \( \mu \) declines the change in the position of the bbe curve becomes smaller relative to the change in the position of \( d + g \).

We reach a critical value of \( \mu \) at which the position of the bbe line is fixed. The adjustment to intermediate-run equilibrium is now described by the movement of the \( d + g \) curve along \( s \). If the intersection of bbe and \( s \) is a position of long-run equilibrium, the economy returns to long-run equilibrium at unchanged prices and output.
The diagram cannot show a determinate result for low values of $\mu$. The reason is that the $bbe$ and $d + g$ lines move in the same direction. Convergence requires that the $bbe$ line moves less than the $d + g$ line. Otherwise, the deficit continues and the stocks of financial assets increase forever. Prices rise continuously as $d + g$ chases $bbe$ along $s$. The system never reaches intermediate-run equilibrium. At the polar position, $\mu = 0$, if the system does not converge to equilibrium, prices rise with a constant monetary base.

Can there be inflation with a constant monetary base? To show that the system converges to an intermediate-run equilibrium for all values of $\mu$, we substitute in the government budget equation until the equation contains only variables taken as givens in the determination of flow equilibrium. The price level $p$ is replaced by the price setting function. The values of $i$ and $y$ are replaced by their flow equilibrium solutions. The $0, AM$ elasticities, as in equation (5), describe the properties of these solutions. Further, we use equation (6) to replace $B$ and $S$ with the cumulated deficit and the stocks $B_o$ and $S_o$. We obtain a differential equation relating the current deficit (or surplus) to the cumulated deficit.

$$\dot{D} = f(D; B_o, S_o, \mu; g, \tau).$$

The stability of the stock–flow system and convergence to intermediate-run equilibrium require that the derivative $f_D < 0$.

The derivative is

$$\frac{\partial f}{\partial D} = \frac{\partial f}{\partial B} \dot{\mu} + \frac{\partial f}{\partial S} (1 - \ddot{\mu});$$

$$\frac{\partial f}{\partial B} = \frac{t}{B} \{ \epsilon(y, B | 0, AM) \left[ \epsilon(p, y | s) \left( \frac{PG}{t} - \epsilon(t, p) \right) - \epsilon(t, y) \right]$$

$$+ \epsilon(I, i) \epsilon(i, B | 0, AM) \frac{IS}{t} \} < 0,$$

$$\frac{\partial f}{\partial S} = \frac{t}{S} \left[ \epsilon(y, S | 0, AM) \left[ \epsilon(p, y | s) \left( \frac{PG}{t} - \epsilon(t, p) \right) - \epsilon(t, y) \right] + \right.$$

$$\left. 1 + \epsilon(I, i) \epsilon(i, S | 0, AM) \frac{IS}{t} \right].$$

The necessary conditions for stability and convergence, with any value of $\mu$ are $\epsilon(y, S | 0, AM) > 0$ and a non-regressive tax function. The first condition is discussed in footnote 9 and the accompanying text. The second condition is required to assure $\partial f/\partial S < 0$. The second term of $\partial f/\partial S$ is positive. The derivative remains negative, however, if net interest payments are sufficiently small relative to tax revenues and tax revenues are not overly regressive.
Analysis of stock–flow adjustment to an intermediate-run equilibrium yields four principal conclusions. First, the relative sizes of the shift elasticities \( \epsilon(p, B|d + g) \) and \( \epsilon(p, S|d + g) \) imply that the instantaneous rate of adjustment of output to a budget deficit or surplus increases with the value of \( \mu \). Second, the total adjustment of output and prices, measured from the initial displacement to the intermediate-run equilibrium, decreases as \( \mu \) increases. The change along a given \( s \) curve reaches a maximum with debt finance, \( \mu = 0 \), and a minimum with base money finance, \( \mu = 1 \). Third, any change in \( \mu \) changes the equilibrium position of the \( bbe \) line and therefore affects prices and output. Fourth, maintenance of stock flow equilibrium at constant prices requires a balanced budget and no open market operations. The first of these restrictions assures that \( D = 0 \); the second maintains a constant ratio of \( B \) to \( S \). Both are required for equilibrium in a non-growing economy.

3.3. Long-Run Equilibrium

Money wages cannot be held fixed if prices and output change. The dynamics of the labor market push the system toward a longer-run position determined by long-run output and the long-run \( bbe \) line. In figure 2 long-run output is shown as a vertical line drawn at \( y_o \). The position of \( y_o \) depends on productive opportunities, resources, and tastes. The long-run position of flow equilibrium and the long-run position of the \( bbe \) line depend on the adjustment of money wages. Even in a closed economy with no growth, the long-run position of stock–flow equilibrium differs from the intermediate-run position if prices and money wages change. To reveal the general nature of long-run adjustment, we permit efficiency wages to adjust to market conditions.

![Figure 2](image-url)
The wage adjustment process can be divided into two parts. One links wage movements to prices and completes our analysis of the response to changes in $B$, $S$, and government expenditure; the other develops the general relation between changes in prices, in efficiency wages and in the deviations of output from its long-equilibrium value. Only the first process is discussed here. The second is developed in Brunner (1974b).

The elasticity $\epsilon(w, p)$ describes the (eventual) adjustment of efficiency wages to prices. Adjustment of wages shifts the supply of output and changes the position of flow equilibrium. The response of the $s$ curve is

$$
\epsilon(p, w|s) \cdot \epsilon(p, w|0, AM, s).
$$

The responses of the price level and output are

$$
\epsilon(p, x|0, AM, s) = \{-\epsilon(p, x|d + g) \cdot \epsilon(p, y|s) \\
+ \epsilon(p, y|d + g) \cdot \epsilon(p, w|s) \cdot \epsilon(w, p) \cdot \epsilon(p, x|0, AM, s)\} \\
\times \{\epsilon(p, y|d + g) - \epsilon(p, y|s)\}^{-1},
$$

$$
\epsilon(y, x|0, AM, s) = \{-\epsilon(p, x|d + g) + \epsilon(p, w|s) \cdot \epsilon(w, p) \cdot \epsilon(p, x|0, AM, s)\} \\
\times \{\epsilon(p, y|d + g) - \epsilon(p, y|s)\}^{-1},
$$

for $x = B, S, g$.

Rearrangement yields

$$
\epsilon(p, x|0, AM, s) = \{\epsilon(p, x|d + g) \cdot \epsilon(p, y|s)\} \cdot \{\epsilon(p, y|d + g) \\
\times \{1 - \epsilon(p, w|s) \cdot \epsilon(w, p)\} - \epsilon(p, y|s)\}^{-1} > 0,
$$

$$
\epsilon(y, x|0, AM, s) = \{-\epsilon(p, x|d + g)\} / \{\epsilon(p, y|d + g) - \epsilon(p, y|s)\} \\
\times 1 + \{\epsilon(p, w|s) \cdot \epsilon(w, p) \cdot \epsilon(p, y|s)\} / \{\text{den}\},
$$

where $\text{den}$ is the denominator of $\epsilon(p, x|0, AM, s)$.

With $\epsilon(p, w|s) \cdot \epsilon(w, p)$ approximately 1,

$$
\epsilon(p, x|0, AM, s) \sim \epsilon(p, x|d + g),
$$

and

$$
\epsilon(y, x|0, AM, s) \sim 0.
$$

In the limiting case of flexible money wages, real output is unaffected by monetary and fiscal policies. The instantaneous shift effect of policy variables on output prices is identical to the long-run effect.

The value of the product $\epsilon(p, w|s) \cdot \epsilon(w, p)$ describing the wage adjustment process probably lies between 0 and 1. The results obtained holding the $s$ line fixed correspond to $\epsilon(p, w|s) \cdot \epsilon(w, p) = 0$. This state describes short-run processes and
is dominated by the response of output. At the opposite pole the price level absorbs all the effects of wage adjustment, and output is not affected. We conjecture that in the intermediate run, the value for $e(p, w | s) - e(w, p)$ produces a noticeable output response. Subsequent wage adjustments strengthen the price response and dampen the output response.

Wage adjustments change little in the dynamics of the intermediate financial stock-flow process. To show this result, we again substitute the solutions from the flow equilibrium system into the deficit function and obtain a differential equation determining the motion of $D$. The main differences from results without wage adjustment are in the properties of the $p$ and $y$ function. With $e(p, w | s) - e(w, p) = 0$ the $p$ function was simply the price setting function, whereas it is now a solution function with arguments $B, S$ and $g$ and properties established in previous paragraphs. The derivative of the deficit function with respect to $D$ is again a linear combination of derivatives with respect to $B$ and $S$ with weights $\mu$ and $(1 - \mu)$.

$$f_B = \frac{t}{B} \left[ e(p, B | 0, AM, s) \left( \frac{pg}{t} - e(t, p) + e(w, p) \left( \frac{wlg}{t} - e(t, wlg) \right) \right) \right.$$  

$$- e(t, y) - e(y, B | 0, AM, s) + e(I, i) \cdot e(i, B | 0, AM, s) IS \frac{I}{t},$$  

$$f_S = \frac{t}{S} \left[ e(p, S | 0, AM, s) \left( \frac{pg}{t} - e(t, p + e(w, p) \left( \frac{wlg}{t} - e(t, wlg) \right) \right) \right.$$  

$$- e(t, y) \cdot e(y, S | 0, AM, s) + [1 + e(I, i) - e(i, S | 0, AM, s)] IS \frac{I}{t}].$$

The interaction of wages and prices raises the third component of both derivatives algebraically and lowers the second component algebraically. Both changes narrow the constraints required to assure stability in the case of debt finance. For stability the system may require a minimal value of $\mu$ to prevent the destabilizing influence arising from a numerically small but positive derivative $f_S$. Instability reflects an inadequate financing procedure of the government and becomes most relevant when interest payments are large relative to taxes.

The operation of the wage adjustment process moves the intermediate-run system expressed by the $d + g, s$ and $bbe$ lines towards an intersection on the vertical long-run output line. Convergence of the system allows us to discuss general directions of longer-run movements by concentrating attention on the intersection between the (long-run) $bbe$ line and the vertical long-run output line. Changes in this intersection determine the system’s underlying trend movement in prices and output. An examination of longer-run aspects requires a clear description of the long-run $bbe$ line.
The line is obtained by replacing $i$ with the solution for $i$ from the asset market (AM) equations and replacing $B$ and $S$ by $B_0 + \mu D$ and $S_0 + (1 - \mu)D$. With these changes, the balanced budget equation becomes

$$pg + \bar{w}lg + I(y[B_0 + \mu D, S_0 + (1 - \mu)D; p, y]) [S_0 + (1 - \mu)D] = t(p, y, \bar{w}lg; \tau).$$

The position of the line depends on the value of $D$. The slope of the line, with $g$ as a policy variable, is

$$\epsilon(p, y|bbe; g) = \epsilon(t, y) - \epsilon(I, i)\epsilon(i, y|AM) IS/t \{pg/t + \epsilon(\bar{w}, p) \bar{w}lg/t
+ \epsilon(I, i)e(i, p|AM) IS/t - \epsilon(t, p) - \epsilon(\bar{w}, p)e(t, \bar{w}lg)\}^{-1} > 0.$$  

We previously noted that allowing for the adjustment of money wages lowers the denominator numerically; the slope of the $bbe$ line becomes slightly steeper. A non-regressive tax revenue function assures that the slope is negative.

The position of the long-run $bbe$ line depends on $D$, the cumulated deficit. Once the fiscal policy variables, $g$ and $\tau$, and the parameter $\mu$ have been fixed, the balanced budget determines $D$. This is necessary to assure that in the long-run $bbe$ and long-run output, $y_0$, intersect at a price level consistent with the long-run solutions of the output market equations and the government budget equation. The solution for $D$ acts as a scale value that places the $bbe$ line at its long-run position.

The value of long-run output depends on opportunities, resources, and tastes. With a stationary population and a constant value of $K$, long-run output $y_0$ and the expected return to capital are fixed. The output and asset market equations determine two ratios and the rate of interest, given long-run output,

\[
p/D = \bar{p}(\mu, g, l_\tau, B_0/D, S_0/D, y_0),
\]
\[
P/D = \bar{P}(\mu, g, l_\tau, B_0/D, S_0/D, y_0),
\]
\[
i = i(\mu, g, l_\tau, B_0/D, S_0/D, y_0).
\]

The price-setting function can be used to determine the money wage consistent with long-run equilibrium. This permits the replacement of $w$ in the budget equation by an expression that is linear, homogeneous in $p$. If we now replace $p$ with $\bar{p}D$, $y$ with $y_0$, and $i$ with $i$ in the government budget equation, the equation determines a value of $D = D^*$ associated with given fiscal and monetary policy. With proportional taxes, $\epsilon(t, p) + \epsilon(t, \bar{w}lg) = 1$, and $S_0 = B_0 = 0$ the value of $D^*$ is arbitrary. Otherwise, the budget equation determines a unique $D^*$. $D^*$ determines the position of the long-run $bbe$ line, and the intersection of the line with $y_0$ determines the price level at which the economy reaches stock equilibrium.

Changes in the intersection between the long-run $bbe$ line and long-run equili-
brium output, \( y_0 \), determine the general direction in which the price level changes. Fiscal policy (\( g, lg, \tau \)) and monetary policy (\( \mu, B_0, S_0 \)) affect the relative changes in the position of both lines. Increases in the government’s absorption of output, \( g \), or absorption of labor, \( lg \), or lower tax rates, raise the bbe line and the price level to which the economy adjusts. Open market operations determine the size of \( B_0 \) relative to \( S_0 \), and the choice of \( \mu \) determines the proportion in which \( B \) and \( S \) are issued or withdrawn to finance budget deficits and surpluses. Increases in \( \mu \) lower the bbe line and reduce the price level to which the economy adjusts.

In the long run, all costs are variable, capital sells at replacement cost, \( p = P \), and the market rate of interest equals the expected return to capital per unit of capital. The system cannot determine values for \( P_D, P_D \) and \( T \) that ignore these constraints. If the capital stock is fixed and monetary policy sets \( \mu \), fiscal policy cannot be predetermined but must adjust to the system. Or, if \( lg, g \) and \( \tau \) are set and \( K \) remains fixed, the system determines \( \mu \) and \( B_0 \) or \( S_0 \).

There is a third alternative. We may choose both fiscal variables, \( B_0 \) and \( S_0 \). The long-run conditions \( p = P \) and \( i = e + \pi \) determine \( K \) and \( \mu \). All real stocks are then determined endogenously and adjusted to policy variables. The long run level of economic activity is conditioned by the stock of real capital, the labor force, the absorption of labor by the government sector, the amount invested in human capital such as skills and knowledge. These determinants of the level at which \( y_0 \) settles depend on fiscal and monetary policies. If expenditure, transfer and tax policies and the means of financing deficits and surpluses are set by political or policy decisions, the capital stock, the productivity of capital, and long-run output, \( y_0 \), must adjust.\(^{10}\)

4. Monetary Policy

The interaction of stocks and flows with the budget deficit or surplus provides a framework within which we can trace the effects of monetary and fiscal policy on prices and output. Population and the capital stock are fixed. There is an efficient long-run output, \( y_0 \), corresponding to the optimal rate of use of fixed capital and manpower for unchanging tastes, opportunities and realized anticipations. Every departure from equilibrium produces a budget deficit or surplus and requires a decision about the financing of the budget, a choice of \( \mu \). The speed of adjustment to a new equilibrium and the characteristics of the new equilibrium depend on the choice. In this section, we analyze the response to changes in

\(^{10}\)Brunner (1974b) examines these longer-run aspects in greater detail. Discussion of a growing economy requires some minor changes discussed there.
monetary policy — changes in the monetary base. Tax rates and real government expenditure remain fixed. In the following section we analyze the response to fiscal changes — changes in government expenditure and tax rates.

We start from a position of stock-flow equilibrium such as \( p_0, y_0 \) in figure 2. The intersection of the bb line and the vertical line at \( y_0 \) determines the position of long-run stock equilibrium. The budget is balanced; all stocks are fixed, unchanging and willingly held at prevailing prices and anticipations. The intersection of \( d + g \) and \( s \) at \( y_0 \) determines the position of full employment flow equilibrium. Equilibrium positions to the right and left of \( y_0 \) are admissible positions of flow equilibrium but not positions of full stock equilibrium. In a growing economy, capital and the effective labor force grow; \( y_0 \) is the rate of output per man with the optimal stock of capital per man. Very little in our discussion depends on the difference between a growing and a non-growing economy, so the capital stock is fixed unless we note the contrary.

Suppose the central bank undertakes an open market operation. A purchase or sale of securities changes \( B_0 \) and \( S_0 \), disturbs the asset market equilibrium and thereby changes \( P \) and \( i \). The initial responses to any change in \( B \) and \( S \) are weighted sums of the elasticities of \( i \) and \( P \) with respect to \( B \) and \( S \). The elasticities and their signs are shown in the appendix. The signs of the elasticities indicate that, initially, asset prices fall and interest rates rise with open market sales. Asset prices rise and interest rates fall with open market purchases. The responses of \( i \) and \( P \) to open market operations are weighted combinations of the responses to \( B \) and \( S \).

Inspection of the elasticities shows that the responses to changes in the base and to open market operations are approximately equal in modern economies with large outstanding public debt.

\[
\epsilon(i, 0M0|AM) = \epsilon(i, B|AM) \frac{B_0}{B} - \epsilon(i, S|AM) \frac{B_0}{S} < 0,
\]
\[
\epsilon(P, 0M0|AM) = \epsilon(P, B|AM) \frac{B_0}{B} - \epsilon(P, S|AM) \frac{B_0}{S} > 0.
\]

In an open market operation, \( B_0 \) and \( S_0 \) change in opposite directions. Open market operations amplify the response of \( i \) and moderate the response of \( P \) relative to fiat changes in the base.

An open market operation disturbs the flow equilibrium. The position of flow equilibrium shifts in proportion to a weighted sum of \( \epsilon(p, B|0, AM) \) and \( \epsilon(p, S|0, AM) \) with weights shown in the previous section. We noted there that the sum is dominated by the response to the base. If we start from full employment, the new position of flow equilibrium is above full employment equilibrium output following an open market purchase and below full employment equilibrium output following a sale. In figure 2, we have shown the response to an open market purchase. Flow equilibrium is at output \( y_1 \), and there is a budget surplus.
Open market operations also change the position of the bbe line. Purchases lower the line by reducing the outstanding stock of securities and interest payments. The response of the bbe line reinforces the output effect; the surplus increases as shown in figure 2.

The budget imbalance induced by monetary policy starts a process that restores stock equilibrium. The budget surplus reduces B and S. The reductions of B and S shift \( d + g \) to the left, reducing expenditure. With \( s \) constant, the position of flow equilibrium moves toward the bbe line. Output and prices decline. The speed of adjustment depends on the financing of the budget, i.e., on the choice of \( u \). A large value of \( u \) raises the rate at which the intersection of \( d + g \) and \( s \) converges to an intersection with \( bbe \). The common intersection is a position of intermediate-run equilibrium.

The position of the bbe line depends on the financing of the surplus. If pure open market operations cease, \( B_0 \) and \( S_0 \) remain at their new values. Further changes in \( B \) and \( S \) arise from the financing of the budget and depend on the choice of \( u \). There is a critical value of \( u \) that holds the bbe line constant. A value of \( u \) less than the critical value reinforces the effect of the open market purchase on the position of the bbe line. The bbe line shifts away from the initial position shown by the solid bbe line in figure 2. A large value of \( u \) offsets the downward shift induced by the initial open market purchase. In this case, the broken bbe line in figure 2 moves in the direction of the solid bbe line.

Fiscal policy \((G, \tau)\) and monetary policy \((\mu, B_0, S_0)\) determine the position of the long-run bbe line. The intersection of the long-run bbe line and the long-run output line, \( y_0 \), determines the long-run equilibrium price level. With fiscal policy constant, the long-run equilibrium price level is lowered by an open market purchase. And the larger \( \mu \) relative to the critical value following the open market purchase, the larger is the decline in the price level.

Figure 2 shows the adjustment. The solid lines are the initial position of equilibrium. An open market purchase raises \( P \) and lowers \( i \), shifting the \( d + g \) curve to the position shown as \( (d + g)_2 \). The bbe line moves down, as shown by the broken line. There is a budget surplus, proportional to \( y_1 - y_2 \). With money wages and anticipations unchanged, the position of the \( s \) curve is fixed. The surplus moves \( d + g \) back along the \( s \) curve until \( s, bbe, \) and \( d + g \) intersect. The intersection is a position of intermediate-run equilibrium. The intermediate-run equilibrium is at an output below \( y_0 \); the precise location depends on the choice of \( \mu \). Money wages gradually adjust to prices, so the efficiency wage declines, and the \( s \) curve shifts to the right. Output increases, and prices fall.

Stock–flow equilibrium at output \( y_0 \) can occur only if the equilibrium price level is fully anticipated by purchasers and producers and embedded in wage contracts. Unless money wages eventually fall during the adjustment to an open market purchase and rise during the adjustment to an open market sale, real
output cannot return to \( y_0 \). With money wages fixed, open market purchases first raise employment, output and prices but adjustment of asset and output markets lowers employment, output and prices. Open market sales have the opposite effects on prices, output and employment.

If there were no adjustment in money wages, real output, or per capita real output, and the price level would be correlated positively. The adjustment of money wages removes the correlation between prices and output, but the price level does not return to its previous value. Output prices and market interest rates are lower at full employment following an open market purchase and higher following an open market sale. The response of interest rates is similar to the conclusion about the effects of open market operations reached by Metzler (1951). The response of prices differs.

All conditions for long-run full equilibrium have not been satisfied at this point. We note that \( \epsilon(P, B | AM) - \epsilon(P, S | AM) \) is positive. Asset prices remain higher relative to output prices after adjustment to an open market purchase and relatively lower after adjustment to an open market sale. Since there cannot be full stock flow equilibrium with \( P = p \), further adjustment is required to reach full equilibrium.

To restore full stock flow equilibrium with unchanged fiscal policy, the composition of expenditure and the size of the capital stock must change. With output prices and market interest rates lower, and asset prices higher, after adjustment to an open market purchase, investment increases relative to consumption, so the capital stock increases. Open market purchases increase the equilibrium stock of capital, or capital per man, and open market sales reduce the equilibrium stock of capital. Long-run output, \( y_0 \), depends on the capital stock and changes as the capital stock changes.

Changes in the \( bbe \) line and the level of long-run output imply that the adjustments following an open market operation do not return the economy to the previous equilibrium. In the equilibrium reached after full adjustment of \( bbe \) and \( y_0 \) to an open market purchase, output, or output per man, is higher and prices are lower. Open market sales reduce equilibrium output and raise prices. In the long-run prices and output are negatively related. After full adjustment, real balances and the stock of real capital are complements; bonds and real capital are substitutes.

The qualitative conclusions from our analysis of the long-run adjustment to an open market operation do not depend on whether equilibrium is disturbed by the purchase or sale of securities, as in Metzler (1951) and Patinkin (1965). Suppose, as is customary, that money is distributed by airplane, destroyed in a furnace, delivered like milk, or withdrawn by vacuum cleaner. Each of these operations changes \( B_e \) and, therefore, the relation of \( B_e \) to \( S_e \). The position of full employment stock-flow equilibrium depends on \( B_e \) and \( S_e \) and changes as
either magnitude changes. The signs of \( e(i, B \mid AM) \), \( e(P, B \mid AM) \) and \( e(p, B \mid O, AM) \) are the same as the corresponding elasticities with respect to open market operations. Money wages must fall to restore full employment following an increase in the base and must rise in the full adjustment to a decrease in the base. The equilibrium capital stock is higher following an increase in base money and lower following a decrease. Prices and real output are negatively related in the long-run response to a change in money just as in the case of an open market operation.\(^{11}\)

To this point, we have assumed that the government maintains real expenditure and keeps tax rates unchanged. The size of the budget deficit or surplus, at each price–output combination, depends on these assumptions. For a given tax rate schedule a policy of maintaining constant nominal expenditure, \( pg \), produces a larger deficit when the base is reduced and a larger surplus when the base is increased relative to the deficit or surplus when fiscal policy holds \( g \) constant.

Maintaining constant nominal government expenditure, \( pg \), increases the contribution of policy to the stability of aggregate real expenditure. The countercyclical increases in debt and money induced by shifts in expenditure are larger than under the policy of keeping \( g \) constant. Moreover, the shift in the position of the bbe line is larger algebraically per unit change in \( B \) but smaller numerically. The size of the shift in the bbe line induced by a change in the base is

\[
e(p, B \mid bbe; pg) = \frac{-e(i, B \mid AM) e(I, i) IS/t}{e(i, p \mid AM) IS/t - e(t, p)} < 0,
\]

The elasticity \( e(p, S \mid bbe; pg) \) is algebraically and numerically smaller than the elasticity for fixed \( g \). A policy of maintaining constant \( pg \) lowers the absolute value of the response of the equilibrium price level to changes in money. If remains true, however, that changes in money change the equilibrium stock of real capital, output, prices and real returns.

5. Fiscal Policy

Monetary policy consists of setting reserve requirement ratios, discount rates and choosing values of \( \mu, B_0 \) and \( S_0 \). Fiscal policy consists of setting government expenditures and tax rates. Fiscal policy determines the relative sizes of the private and public sectors and the distribution of income.

\(^{11}\)A qualification to these propositions is that an initial increase in \( B \), with \( S \) unchanged, followed by a financial policy of maintaining \( \mu = 1 \) restores the previous equilibrium. This is the analogue of a fiat change in money when the government budget equation is acknowledged.
Policies interact. The speed of adjustment to changes in monetary policy depends on a fiscal decision, the decision to maintain constant real or nominal government expenditure. The size of the "automatic" or "built-in" stabilizers increases, at any deviation from full employment output, if the maintained fiscal policy holds nominal expenditure constant. The response to a change in tax rates or real government expenditure varies with the method of financing the resulting deficit or surplus, the choice of \( \mu \).

In this section, we analyze the response to changes in \( g \) on short- and long-run equilibrium. To separate the effects of fiscal and monetary policy, we assume throughout this section that \( \mu \) remains constant at the prevailing value of \( B/S \).

Base money and securities are issued or withdrawn in proportion to the ratio of \( B \) to \( S \) prevailing before the fiscal change. \( B_0 \) and \( S_0 \) are constant also.

Every change in \( g \) (or \( \tau \)) disturbs both the flow equilibrium and the stock equilibrium. Per unit percent change in \( g \) the \( d + g \) curve shifts by an amount

\[
\epsilon(p, g|d + g) = -\gamma/[(1 - \gamma) \tilde{c}(d, p)] > 0.
\]

The denominator is negative, as discussed previously, so an increase in government expenditure raises prices and output, and a reduction in \( g \) lowers prices and output. The size of the response depends on the distribution of expenditure between the government and the private sector. The larger is \( \gamma \), the larger is the relative size of the government. The size of the response of prices to fiscal policy on the output market increases as \( \gamma \) increases.

The change in the stock equilibrium position depends on the method of financing the resulting deficit or surplus, the value of \( \mu \), on the tax revenue function, and on the choice of \( g \) or \( pg \) as a budget or expenditure policy. Holding \( g \) constant at the level reached after the change induces a much larger shift in the stock equilibrium position than holding nominal government expenditure constant. The reason is that with real expenditure constant the price level must rise or fall until the private sector releases or absorbs an amount of real output equal to the change in \( g \). Holding \( pg \) constant, following a change in real expenditure, distributes the effect of the induced price change between the real expenditure of the government and private sectors. The effects of the alternative policies on the stock equilibrium position is shown by comparing the changes in the position of the \( bbe \) line,

\[
\epsilon(p, g|bbe; g) = \frac{-[pg/t]}{pg/t - \epsilon(t, p) + \epsilon(i, i) \epsilon(i, p|AM) IS/t} > 0,
\]

\[
\epsilon(p, g|bbe; pg) = \frac{-[pg/t]}{-\epsilon(t, p) + \epsilon(i, i) \epsilon(i, p|AM) IS/t} > 0.
\]
The relative responses to the two types of expenditure policy depend only on the denominators. The denominator of \( \epsilon(p, g | bbe; pg) \) is approximately unity, so the ratio of the two elasticities is approximately equal to

\[
\frac{(pg - t)}{-t} = IS/t,
\]

the ratio of interest payments to tax collections. At current values, the policy of holding \( g \) constant raises the response of the price level to fiscal changes by a factor of 9 or 10.

An increase in \( g \) raises both the \( d + g \) line and the \( bbe \) line. The relative magnitude of the two vertical shifts determines the system's subsequent adjustment. If the shift of the \( d + g \) line exceeds the shift of the \( bbe \) line, the flow equilibrium at an intersection of \( d + g \) and \( s \) lies to the right of the \( bbe \) line. The financial stock–flow equilibrium on \( bbe \) associated with the new level of \( g \) is below the new flow equilibrium position. The increase in \( g \) produces a surplus, lowering \( B \) and \( S \) and driving the \( d + g \) line back to the \( bbe \) line. If the response of the \( bbe \) line is larger than the response of \( d + g \), the new flow equilibrium occurs below the new \( bbe \) line. There is a budget deficit. The resulting deficit accelerates \( B \) and \( S \), expands output and raises prices. The additional increases in \( p \) and \( y \) are responses to the financial consequences of the deficit.

The position of intermediate-run stock–flow equilibrium reached after adjustment to the change in \( g \) and the resulting deficit or surplus depends on the slopes of the \( d + g \), \( s \), and \( bbe \) curves and on the size of the shifts, \( \epsilon(p, g | d + g) \) and \( \epsilon(p, g | bbe) \). Both the slope and the position of the balanced budget equation depend on the choice of budget policy – constant real or nominal expenditure. Moreover, the slope of the price setting function depends on capacity utilization. All that can be said without considering relative orders of magnitude is that, for given anticipations, money wages and stock of capital, stock–flow equilibrium lies at higher output and prices following the adjustment to an increase in \( g \) and at lower output and price level following a reduction in \( g \).

With constant anticipations and money wages, expansive fiscal policy lowers real wages; and fiscal contraction increases real wages (per efficiency unit). The change in real wages is a main reason that stock–flow equilibrium can be achieved temporarily at a position above or below full employment. Restoring real wages to the level of the previous full employment equilibrium by changing money wages does not restore the price level that prevailed at the previous full stock–flow equilibrium. The \( bbe \) line and therefore the position of stock equilibrium has changed. If, as we have assumed, real or nominal expenditure and \( \mu \) are maintained, the price level remains higher than in the previous equilibrium following an increase in \( g \), and prices remain lower after a reduction in \( g \). The magnitude of the price change depends, of course, on the choice of expenditure policy.
The economy cannot return to full stock–flow equilibrium if asset prices and output prices are unequal. Increases in \( g \) raise \( p \) and, generally, lower \( P \) and increase \( i \). The changes in \( P \) and \( i \) are a consequence of the redistribution of income and the effects of the redistribution on the credit and money markets. The changes in \( P \), \( i \) and \( p \) assure that the intermediate-run stock–flow equilibrium reached following adjustment to a change in \( g \) is not maintained. Even if money wages remain unchanged, the stock equilibrium and the flow equilibrium cannot persist. The increase in \( p \) and reduction in \( P \), following an increase in \( g \), leaves the price of existing assets lower than the price of current output. Any increase in money wages further increases prices and interest rates and lowers asset prices. To restore full equilibrium, the distribution of expenditure between consumption and investment must change. An increase in consumption and a reduction in investment moves the economy toward equilibrium, the capital stock (or capital per man) is smaller following an increase in \( g \) and larger following a reduction in \( g \). For the
longer-run adjustment of the price level to a change in $g$, the effects on $bbe$ and long-run output are reinforcing. The level of prices is positively related to $g$.

Fiscal policy has short-run, intermediate-run and long-run effects. Figure 3 brings out aspects of these adjustments. We start from a full stock–flow equilibrium, at the intersection of the solid lines in figure 3a. The budget is balanced; and the flow markets are in equilibrium at long-run output equal to $y_0$. An increase in $g$, with $\mu$, $B_0$, and $S_0$ given, raises the $bbe$ line to $bbe$, and the $d + g$ line to $(d + g)$.

Comparison of the two responses to $g$ shows that $\epsilon(p, g | d + g)$ is a small fraction of $\epsilon(p, g | bbe; g)$. The size of the relative shifts assures that the flow equilibrium at the intersection of $(d + g)$, and $s$ is to the left of $bbe_1$. The government budget is in deficit. Point $A$ shows the short-run flow equilibrium.

The financing of the deficit gradually moves the $d + g$ line to the right. With fixed $B_0$ and $S_0$, and $\mu$ below the critical level, the cumulated deficit, $D$, moves the $bbe$ line to the right along the $s$ curve. The economy reaches point $B$, a position of intermediate-run equilibrium at the intersection of $bbe_2$, $s$ and $d + g$ curve. Output and prices are higher. The movement from the initial position to $A$ is the pure fiscal effect of fiscal policy and the movement from $A$ to $B$ shows the financial effect of the same policy.

The system does not remain at the intermediate-run position, $B$. Output at $B$ is above the long-run level; wages and prices rise, and the $s$ line moves to the left. A further round of financial stock–flow adjustments moves the flow equilibrium system along a northwesterly path toward the intersection of the long-run $bbe$ line and the new level of long-run output, $y_1$, in figure 3b.

Fiscal policy has real and nominal effects in the short and in the long run. Our discussion of figure 3 shows that the expansive effect of an increase in $g$ is eroded in the longer run by the operation of the wage adjustment process. Eventually, the adjustment of the stock of real capital converts the initial expansion of output into a decline of long-run output. Prices are higher in both the short and long run relative to the price level in the initial equilibrium. A reduction in $g$, depresses real output in the shorter run but increases long-run output of the private sector. Prices are lower following the reduction in $g$.

Similar conclusions are obtained from the analysis of changes in tax rates. Increases in tax rates reduce output prices, interest rates and asset prices and raises real wages in the short run. The size of the price and interest rate changes depends on expenditure policy. A policy of maintaining constant nominal expenditure induces smaller changes in the position of stock equilibrium than a policy of maintaining constant real expenditure. Full adjustment to an increase in tax rates is not completed until money wages fall and asset prices are again equal to output prices. The composition of real expenditure changes to adjust the capital stock.
6. Monetarist Implications and Conjectures

What makes our theory a monetarist theory instead of a Keynesian, neo-Keynesian or quantity theory? We trust that the careful reader finds many points at which we do not differ from other economists, including economists who would not christen their theories "monetarist". Often, labels remain, sustained by the intellectual laziness that postpones careful examination of implications and propositions long after hypotheses have changed and distinctions have blurred. There is, therefore, reason to end this paper by pointing to the characteristics that we regard as "monetarist", if a label is to be assigned, and to point out also the relation of the implications and conjectures to the hypothesis.

A theory is not a monetarist theory unless three conditions are met. One, the long-run position to which the system moves is determined by stocks, particularly the stock of money, and not by flows. Stocks and flows interact, but in the longer run, flows adjust to stocks. Two, the adjustment to a change in money involves substitution between money, other assets and new production. Adjustment is not confined to a narrow range of assets, called bonds, or a single price, "the" interest rate. Changes in money modify relative prices and initiate a process of substitution that spreads to the markets for existing capital, securities, loans and current output. Three, the economic system is stable. Cumulative movements of prices or output result mainly from the decisions or actions of governments not individuals or private institutions. The private sector has a stabilizing influence, so that the economy adjusts to any maintained policy.

Together, or separately, we and other "monetarists" have made these statements, or similar statements, for many years. Contrasts and conflicts between "monetarists" and non-monetarists are most apparent in policy recommendations or criticisms and discussions of past and future courses of action. These discussions reveal differences in analysis and interpretation of events that cannot be reduced to differences about the slopes of standard IS and LM curves of Hicks' or the similar curves of Metzler's analysis, as is often suggested [Okun (1971) and Samuelson (1969)].

The transmission of monetary changes, in our analysis, does not depend on the interest elasticities of the demand for money and expenditure. The relative interest elasticities that matter are the interest elasticities of the money and credit markets. As long as the credit market response to interest rates exceeds the money market response, increases in the base raise the prices of real assets and reductions in the base lower asset prices. Moreover, a small response of expenditure to interest rates, "elasticity pessimism", has no implication for the effectiveness of monetary policy. Monetary policy affects expenditure by changing interest rates and asset
prices, so the combined effects of the changes, not the separate effects, determines
the response of expenditure.

The difference in implications reflects differences in the transmission or adjust-
ment process. In Hicksian analysis, real capital is locked in portfolios and is not
affected by the substitution and adjustment processes. There are markets for
money and bonds, but Walras' law is used to eliminate analysis of the bond
market. The money market remains as the only relevant asset market. In Metzler's
interpretation, real output is fixed and all non-monetary assets are perfect sub-
stitutes, so a single asset price or interest rate is all that is required for the analysis
of substitution between money and other assets.

Metzler's analysis clarified a number of outstanding issues. However, he did not
analyze positions other than long-run full equilibrium or permit prices of existing
assets to differ from replacement costs. To move beyond his analysis, we assume
that bonds and claim to real capital are not perfect substitutes. The money market
is supplemented by another asset market, the credit market. Asset prices join
interest rates in the transmission of monetary (and fiscal) changes. Once these
changes are made, the response of assets and output to policy variables becomes
more pervasive than in Keynesian models.

Long-run positions of stock-flow equilibrium are adjustments to the position
determined by past policies, real resources, tastes, opportunities and realized antici-
pations. The accumulated effects of past policies determine the outstanding
stocks of money and debt. Fiscal policy determines the size of budget deficits or
surpluses and monetary policy determines the distribution of stocks of financial
assets between money and debt. If fiscal and monetary policies remain fixed, long-
run equilibrium requires adjustment of the prices of assets and output and the
stock of real capital. In the long run, government securities and real capital are
substitutes; base money and capital are complements.

The price level and real output settle at a position determined by the stocks
of money, debt and capital, for given resources, tastes and opportunities. In
stationary, long-run equilibrium the budget must be balanced and the stocks of
money and debt unchanging. We show that, if the system is stable and there are
reasonable restrictions on the tax revenue function, the economy converges to
an equilibrium for any combination of debt and base money issued or withdrawn
to finance budget deficits or surpluses. The principal long-run effects of maintained

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12 The real capital market is related by Walras' law to the credit and money market. The choice of
the two markets involves no logical issue. It reflects a judgment about a useful strategy for empirical
research.

13 The qualifications apply to fiscal policy financed by debt issues. The response of real output to a
change in debt depends on a combination of negative and positive responses $\epsilon(d, i) \epsilon(i, S_{AM}) +$
government policies are on the level of prices, the distribution of output between consumption and investment expenditure and the level of output at which the economy reaches equilibrium, not on the existence of equilibrium. The private sector adjusts to any set of maintained government fiscal and monetary policies.

Of particular interest is the response to a maintained change in real or nominal government expenditure financed entirely by issuing debt. Our analysis implies that the interaction of stocks and flows brings the budget into balance at a constant price level, under the conditions reiterated in footnote 13. Fiscal changes induce once and for all adjustments of the equilibrium price level, long-run equilibrium output and the stock of capital.

A maintained fiscal position does not induce steady inflation or deflation whether financed entirely by debt or by base money. The main differences between money and debt finance are on the level of long-run output and prices and on the speed of adjustment to equilibrium. The speed of adjustment to a deficit rises with the ratio of base money to debt issued (or withdrawn in the event of a surplus). The long-run price level is lower and output is higher the larger the ratio of base money to debt accumulated in the financing of deficits and surpluses and resulting from open market operations.

The stability of the private sector, one of the principal monetarist conjectures, is an implication of our stock flow analysis. Keynesians typically assume that the private sector is unstable. Waves of optimism or pessimism, stable Phillips curves and the "autonomy of the wage unit" determine the rate of inflation. Any proposition asserting that prices or wages move independently of current and past market conditions and the values of financial variables is inconsistent with the monetarist proposition and with our analysis. The evidence is not conclusive but we believe that the weight of the evidence, including the evidence from large econometric models, supports us.

The stability of the private sector supports another of the principal monetarist propositions. Inflation (or deflation) can occur, in our analysis, only if some impulse is maintained. A one-time change in base money, government expenditure, tax rates, debt, or anticipated real returns produces at most a one-time adjustment of prices. Inflation or deflation cannot occur unless some impulse is

Footnote 13 continued
\[ \varepsilon(d, P) = (P, S|AM) \] that must be non-negative if the system is stable. Also a slightly progressive tax revenue function may be required to balance the budget at the higher or lower interest payments resulting from the financing of fiscal policy solely by issuing or withdrawing debt.

14 An explicit statement of the "autonomy" of prices and wage movements is in a recent paper by Lerner (1974). He argues that excess demand creates inflation and deficient demand creates depression (at unchanged prices or wages). Therefore, if one observes "stagflation" one necessarily has a demand deficiency. But, we also require recognition of a supplementary force driving prices independently of market conditions.
maintained. We observe secular increases in the share of output absorbed by the government sector in many countries, but we have not observed sporadic increases capable of explaining observed inflation or deflation. Nor do we know of any evidence of steady changes in the expected return to capital or the monopoly positions of unions and corporations that is capable of explaining current or past rates of price change. The absence of such evidence is inconsistent with the eclectic-agnostic view and the “special factors” explanations of inflation and deflation. Evidence showing the effect of monetary growth on inflation and deflation is consistent with our analysis, supports our hypothesis and the monetarist proposition that the monetary impulse is the dominant impulse in inflations or deflations.

The three conjectures constitute the core of monetarism, but they are not the only monetarist propositions. Differences between monetarists and some Keynesian and eclectic economists are not limited to conjectures about the impulses initiating major changes in prices and output, or the processes transmitting such changes from one market to another, or the stability of the private sector. There are differences in methods also. Monetarists have not developed large-scale econometric models—models with twenty or more behavior equations—to analyze or predict aggregate behavior. The reason is that many Keynesians treat allocative detail as central to an explanation of aggregative behavior, and monetarists do not. Nowhere in our discussion of short- and intermediate-run adjustment did we find reason to mention the distribution of output between consumption and investment or the many kinds of consumption and investment spending. For us, the distribution of private expenditure is determined by relative prices and wealth in response to monetary and fiscal policies. The distribution is not invariant. In the long run, fiscal policy determines the absolute size of the government sector and the relative size of the private and the government sector. Both the stock of private capital and the level of long-run output change inversely to the size of the government sector and the stock of securities. Changes of this kind have important long-run but not short-run effects on output and the price level.

On the asset market of our analysis, the excess supply of government securities and the excess supply of money simultaneously determine the asset price level and the market rate of interest. The allocation of credit by type of loan or securities plays no role and has no effect on aggregates. In large, econometric models, and in policy discussions, many Keynesians assign importance to the allocation of credit. Selective credit controls, changes in the stock of mortgages, and other changes in the distribution of financial assets have effects on the composition of spending and on aggregate output. “Credit rationing” and institutional practice are used to justify these hypotheses and policy recommendations.

Once again, the difference in analysis reflects a difference in the roles assigned
to relative prices. To us, "credit rationing" means that the empirical counterpart of the term "price" often includes the terms and conditions of a contract or agreement. The adjustment of relative prices includes such changes in terms. Changes in terms and conditions under which borrowing and lending occur change the allocation of financial assets but have very little effect on the allocation of real resources and no effect on total spending.

A century of assertions has not produced any reliable or persuasive evidence that the phenomenon called "credit rationing" affects the composition of spending or its total. The absence of such evidence is support for the monetarist proposition and our hypothesis that assign no role to allocative detail.

Discussion of the conjectures and implications dividing economists, and their relation to the formal analysis of the paper, can be extended. Perhaps enough has been said to justify our contention that monetarism is not a set of empirical conjectures about the slopes of \( IS \) and \( LM \) curves or a proposition denying any effect of fiscal policy.

**Appendix: Some Asset Market Responses**

1. Response to the base,

\[
e(i, B|AM) = -\frac{\epsilon(MM, P) - \epsilon(CM, P)}{\epsilon(CM, i) \cdot \epsilon(MM, P) - \epsilon(MM, i) \cdot \epsilon(CM, P)} < 0,
\]

\[
e(P, B|AM) = -\frac{\epsilon(CM, i) - \epsilon(MM, i)}{\Delta},
\]

where \( \Delta \) is the same denominator as in \( \epsilon(i, B|AM) \). The components of the expression defining the two elasticities are

\[
\epsilon(CM, i) = \epsilon(a, i) - \epsilon(\sigma, i) > 0, \quad \epsilon(MM, i) = \epsilon(m, i) - \epsilon(L, i) > 0,
\]

\[
\epsilon(CM, P) = \epsilon(a, P) - \epsilon(\sigma, P) > 0, \quad \epsilon(MM, P) = \epsilon(m, P) - \epsilon(L, P) < 0.
\]

Inspection of these expressions yields the following interpretation:

\( \epsilon(CM, i) \) the interest elasticity of the excess supply of "bank credit" or earning assets,

\( \epsilon(MM, i) \) the interest elasticity of the excess supply of money.

A similar interpretation applies to the two elasticities with respect to \( P \).

The following inequality is the basic order constraint of our analysis,

\( \epsilon(CM, i) > \epsilon(MM, i) > 0. \)
The reader should note that with \( e(CM, i) = e(MM, i) \) the extended range of substitution relations induced by changes in \( B \) becomes irrelevant. Debt and real capital remain less than perfect substitutes, and our analysis of fiscal policy is unaffected.

(2) Response to government securities,
\[
\begin{align*}
\epsilon(i, S|AM) &\sim \frac{\epsilon(MM, P)}{A} \frac{S}{aB}, \\
\epsilon(P, S|AM) &\sim -\frac{\epsilon(MM, i)}{A} \frac{S}{aB}.
\end{align*}
\]
The approximations \( (\sim) \) denote that minor effects of wealth are omitted.

(3) Response to \( p \),
\[
\begin{align*}
\epsilon(i, p|AM) &= -\frac{\epsilon(CM, p) \epsilon(MM, P) - \epsilon(MM, p) \epsilon(CM, P)}{A}, \\
\epsilon(P, p|AM) &= -\frac{\epsilon(CM, p) \epsilon(MM, p) - \epsilon(MM, i) \epsilon(CM, p)}{A}.
\end{align*}
\]
where
\[
\epsilon(CM, p) = \epsilon(a, p) - \epsilon(a, \varepsilon_0) < 0, \quad \epsilon(MM, p) = \epsilon(m, p) - \epsilon(L, p) < 0.
\]
The sign for \( \epsilon(P, p|AM) \) is based on the order condition \( 0 > \epsilon(CM, P) > \epsilon(MM, p) \). Note that \( |\epsilon(P, p|AM)| < 1 \).

(4) Response to \( y \),
\[
\begin{align*}
\epsilon(i, y|AM) &= -\frac{\epsilon(CM, y) \epsilon(MM, P) - \epsilon(MM, y) \epsilon(CM, P)}{A}, \\
\epsilon(P, y) &= \frac{\epsilon(CM, i) \epsilon(MM, y) - \epsilon(MM, i) \epsilon(CM, y)}{A},
\end{align*}
\]
where
\[
\begin{align*}
\epsilon(CM, y) &= \left[ \epsilon(a, W_h) - \epsilon(\sigma, W_h) \right] \epsilon(W_h, y), \\
\epsilon(MM, y) &= \left[ \epsilon(m, W_h) - \epsilon(L, W_h) \right] \epsilon(W_h, y).
\end{align*}
\]
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